WHAT IS CLAIMED IS:

1. A process for preparing monodisperse ion exchangers having chelating functional groups comprising

(a) reacting monomer droplets made from at least one monovinylaromatic compound and at least one polyvinylaromatic compound to give a monodisperse, crosslinked bead polymer,

(b) amidomethylating the monodisperse, crosslinked bead polymer from step (a) with phthalimide derivatives,

(c) converting the amidomethylated bead polymer from step (b) to an aminomethylated bead polymer, and

(d) converting the aminomethylated bead polymer from step (c) to ion exchangers having chelating groups.

2. A process according to Claim 1 wherein the monomer droplets are microencapsulated using a complex coacervate.

3. A process according to Claim 1 wherein step (a) is carried out in the presence of a protective colloid.

4. A process according to Claim 1 wherein step (a) is carried out in the presence of at least one initiator.

5. A process according to Claim 1 wherein the monomer droplets comprise porogens that, after the polymerization, form macroporous, crosslinked bead polymers.

6. A process according to Claim 1 wherein a polymerization inhibitor is used in step (a).

7. A process according to Claim 3 wherein the protective colloids are gelatin, starch, polyvinyl alcohol, polyvinylpyrrolidone, polyacrylic acid, polymethacrylic acid, copolymers made from (meth)acrylic acid or (meth)acrylate, or mixtures thereof.

8. A process according to Claim 1 wherein the monovinylaromatic compounds are monoethylenically unsaturated compounds.

9. A process according to Claim 1 wherein the polyvinylaromatic compounds are divinylbenzene, divinyltoluene, trivinylbenzene, divinylnaphthalene, trivinylnaphthalene, 1,7-octadiene, 1,5-hexadiene,

ethylene glycol dimethacrylate, trimethylolpropan trimethacrylate, allyl methacrylate, or mixtures thereof.

10. A process according to Claim 1 wherein the initiator is a peroxy compound or an azo compound.

11. A process according to Claim 10 wherein the initiator is dibenzoyl peroxide, dilauroyl peroxide, bis-(p-chlorobenzoyl) peroxide, dicyclohexyl peroxydicarbonate, tert-butyl peroctoate, tert-butyl peroxy-2-ethyl-hexanoate, 2,5-bis-(2-ethylhexanoylperoxy)-2,5-dimethylhexane, or tert-amylperoxy-2-ethylhexane,

12. A process according to Claim 10 wherein the initiator is 2,2'-azobis(isobutyronitrile) or 2,2'-azobis-(2-methylisobutyronitrile).

13. A process according to Claim 1 wherein a phthalimido ether is formed in step (b).

14. A process according to Claim 13 wherein the phthalimido ether is prepared from phthalimide or from a derivative thereof and formalin.

15. A process according to Claim 13 wherein the reaction of the phthalimido ether with the bead polymer takes place in the presence of oleum, sulfuric acid, or sulfur trioxide.

16. A process according to Claim 1 wherein step (d) is carried out using compounds that develop the chelating properties of a functionalized amine.

17. An ion exchanger having chelating functional groups prepared by a process according to Claim 1.

18. An ion exchanger according to Claim 17 having a macro-porous structure.

19. A process comprising removing heavy metals or noble metals from aqueous solutions, from saline solutions from alkali metal chloride electrolysis, from aqueous hydrochloric acid, from waste water or flue gas scrubber effluent, from ground water or landfill eluate, from liquid or gaseous hydrocarbons, carboxylic acids, or from halogenated hydro-

carbons with an ion exchanger having chelating functional groups prepared by a process according to Claim 1.

20. A process according to Claim 19 wherein the metal is mercury, iron, cobalt, nickel, copper, zinc, lead, cadmium, manganese, uranium, vanadium, elements of the platinum group, gold, silver, or a combination thereof.

21. A process according to Claim 19 wherein rhodium, elements of the platinum group, gold, silver, rhodium- or noble-metal-containing catalyst residues are removed from organic solutions or solvents.

22. A process according to Claim 19 wherein heavy metals or noble metals are removed from recycle wastes.

23. A process according to Claim 19 wherein alkaline-earth metals are removed from saline solutions from alkali metal chloride electrolysis.

24. A process according to Claim 19 wherein heavy metals are removed from substances that are converted by electrolytic treatment.